



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/705,978	11/13/2003	Jimmy Hsu	BHT-3111-373	6779
7590 09/28/2004				
BRUCE H. TROXELL 5205 LEESBURG PIKE, SUITE 1404 FALLS CHURCH, VA 22041			EXAMINER TRINH, HOA B	
			ART UNIT 2814	PAPER NUMBER

DATE MAILED: 09/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/705,978	Applicant(s) HSU, JIMMY	
	Examiner Vikki H Trinh	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: reference number 310. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to because on page 1, line 21, "chip 125" should be "chip 110". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the

Art Unit: 2814

renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claim 1 is objected to because of the following informalities: In claim 1, line 5, "comprises" should be "comprise". Appropriate correction is required.

5.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Pace (5,904,499).

Art Unit: 2814

Pace (5,904,499) discloses a bonding pad structure having, as to claims 1 and 6-8, at least two bonding pads 341 (fig. 5h), wherein the pads comprise at least two metal layers 519, 518, 514 (fig. 5h) and at least two plugs (fig. 5h) that are superimposed one another; wherein at least a metal layer extends parallel and overlap other metal layer to form a resulted capacitor; wherein the metal layers or plates are positioned apart from one another. See fig. 5h and attachment.

As to claim 2, the electronic device is a chip 340. See attachment.

As to claim 3, the electronic device is a printed board. See fig. 1.

As to claim 4, the chip 340 comprises 6 metal layers . See attachment.

As to claim 5, the bonding pad structure has three bonding pads 341. See attachment.

Conclusion

1. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (571) 272-1705. The office fax number is 703-872-9306.

Any request for information regarding to the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available

Art Unit: 2814

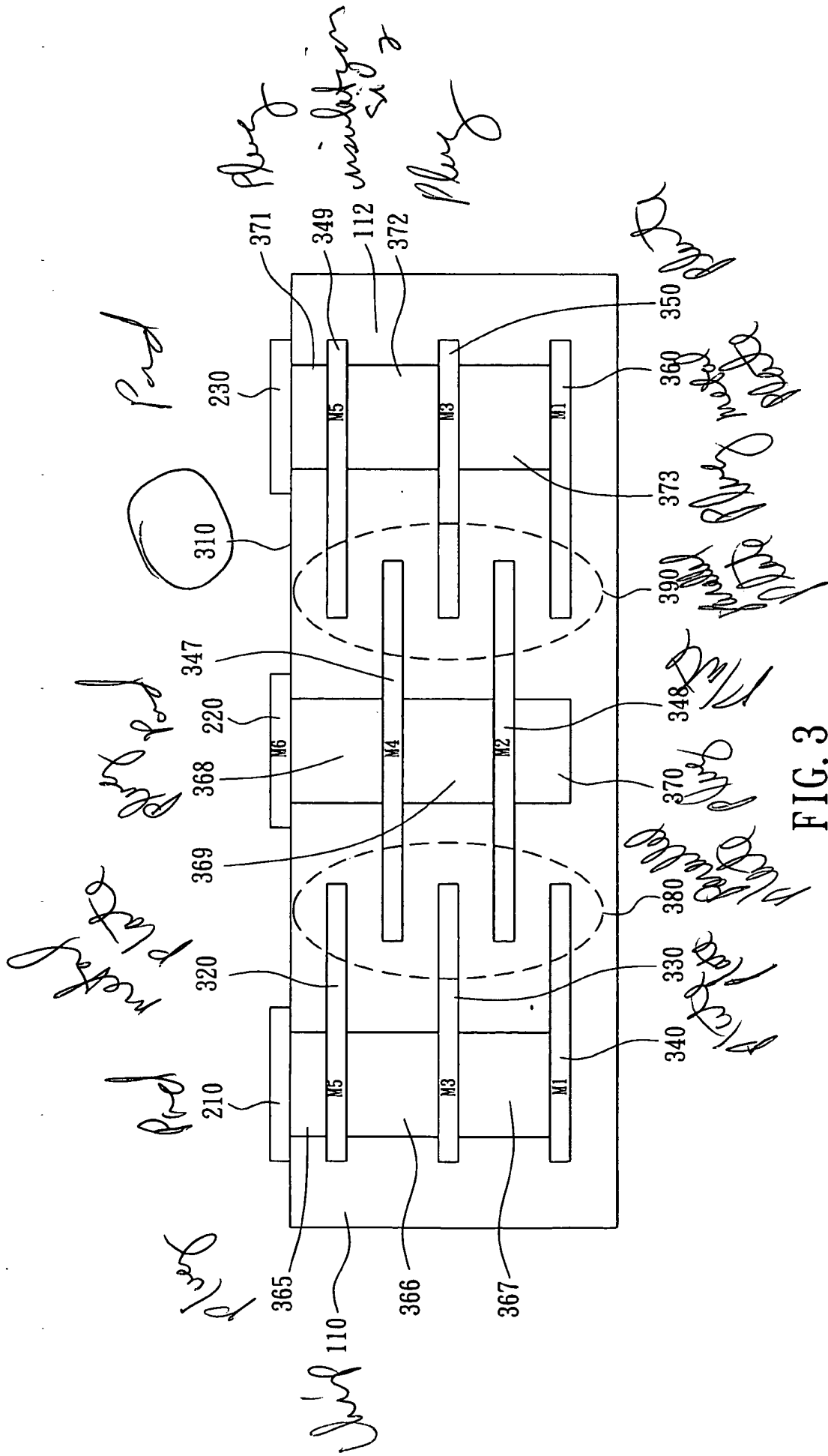
through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspro.gov>. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

Vikki Trinh,
Patent Examiner
AU 2814



LONG PHAN
PRIMARY EXAMINER





US005904499A

United States Patent [19]
Pace

[11] **Patent Number:** **5,904,499**
[45] **Date of Patent:** **May 18, 1999**

[54] **PACKAGE FOR POWER SEMICONDUCTOR CHIPS**

[76] **Inventor:** **Benedict G Pace**, 2200 Smithtown Ave., Ronkonkoma, N.Y. 11779

[21] **Appl. No.:** **08/906,045**

[22] **Filed:** **Aug. 5, 1997**

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/767,160, Dec. 16, 1996, Pat. No. 5,866,441, which is a continuation of application No. 08/689,388, Aug. 12, 1996, Pat. No. 5,627,406, which is a continuation of application No. 08/361,931, Dec. 22, 1994, abandoned.

[51] **Int. Cl.⁶** **H01L 21/44**

[52] **U.S. Cl.** **438/108; 438/121**

[58] **Field of Search** **438/107, 108, 438/121, 125**

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,614,194	9/1986	Jones et al.	
4,814,295	3/1989	Mehta	438/125
4,874,721	10/1989	Kimura et al.	
4,919,728	4/1990	Rai et al.	
5,111,278	5/1992	Eichelberger	
5,156,997	10/1992	Kumar et al.	
5,166,773	11/1992	Temple et al.	
5,216,278	6/1993	Lin et al.	
5,250,469	10/1993	Tanaka et al.	
5,252,519	10/1993	Nakatani et al.	
5,265,321	11/1993	Nelson et al.	
5,346,857	9/1994	Scharr et al.	438/125
5,361,491	11/1994	Oomachi et al.	
5,410,451	4/1995	Hawthorne et al.	438/125
5,476,818	12/1995	Yanof et al.	
5,672,545	9/1997	Trautt et al.	438/108
5,712,192	1/1998	Lewis et al.	438/108

FOREIGN PATENT DOCUMENTS

0 165 575 A2	12/1985	European Pat. Off.
0 525 497 A1	2/1993	European Pat. Off.
39 09 244 A1	9/1990	Germany
42 29 964 A1	3/1993	Germany
2 225 670	6/1990	United Kingdom
WO 94 18707	8/1994	WIPO

OTHER PUBLICATIONS

Yamamoto, Sugimoto, Miyake & Blankenhorn, *Evaluation of New Micro-Connection System Using Microbumps*, Microcircuits & Electronic Packaging, 15, 259-271 (1994).
Mathew, Kovac, Martinez & DiStefano, *Area Array Packaging Advanced Packaging*, Jul./Aug., 91-94 (1994).

DeHaven & Dietz, *Controlled Collapse Chip Connection (C4)—An Enabling Technology*, Proc. 1994 IEEE 44th Electronic Comp. & Tech. Conf., IEEE, Piscataway, NJ (1994).

R. Tummula & E. Rymaszewski, *Microelectronics Packaging Handbook* Van Nostrand Reinhold, NY 363-380 (1989).
Balderas, Lynch & Yacavonis, *Heat Dissipation From IC Chips Through Module Package*, IBM Tech. Disclosure Bull. 19 (11) 4165-6 (Apr. 1977).

Primary Examiner—Kevin M. Picardat

Attorney, Agent, or Firm—John F. McCormack

[57]

ABSTRACT

An electronic packaging module for bonding of power semiconductor devices is produced. The semiconductor device is mounted on a base, and enclosed by a frame and lid. The lid is an insulating substrate having a conductive pattern with protuberances on the conductive pattern of the substrate. The protuberances are of a soft, ductile metal capable of being metallurgically bonded to the metallization pads of semiconductor devices. The metal protuberances are bonded to the semiconductor device joining it to the lid, and through the conductive pattern of the lid connecting the device to the input/output contacts of the package.

30 Claims, 18 Drawing Sheets

